REALM: Retrieval-Augmented Language Model Pre-Training

Abstract

Language model pre-training has been shown to capture a surprising amount of world knowledge, crucial for NLP tasks such as question answering. However, this knowledge is stored implicitly in the parameters of a neural network, requiring ever-larger networks to cover more facts.

To capture knowledge in a more modular and interpretable way, we augment language model pre-training with a latent knowledge retriever, which allows the model to retrieve and attend over documents from a large corpus such as Wikipedia, used during pre-training, fine-tuning and inference. For the first time, we show how to pre-train such a knowledge retriever in an unsupervised manner, using masked language modeling as the learning signal and backpropagating through a retrieval step that considers millions of documents.

We demonstrate the effectiveness of Retrieval-Augmented Language Model pre-training (REALM) by fine-tuning on the challenging task of Open-domain Question Answering (Open-QA). We compare against state-of-the-art models for both explicit and implicit knowledge storage on three popular Open-QA benchmarks, and find that we outperform all previous methods by a significant margin (4-16% absolute accuracy), while also providing qualitative benefits such as interpretability and modularity.